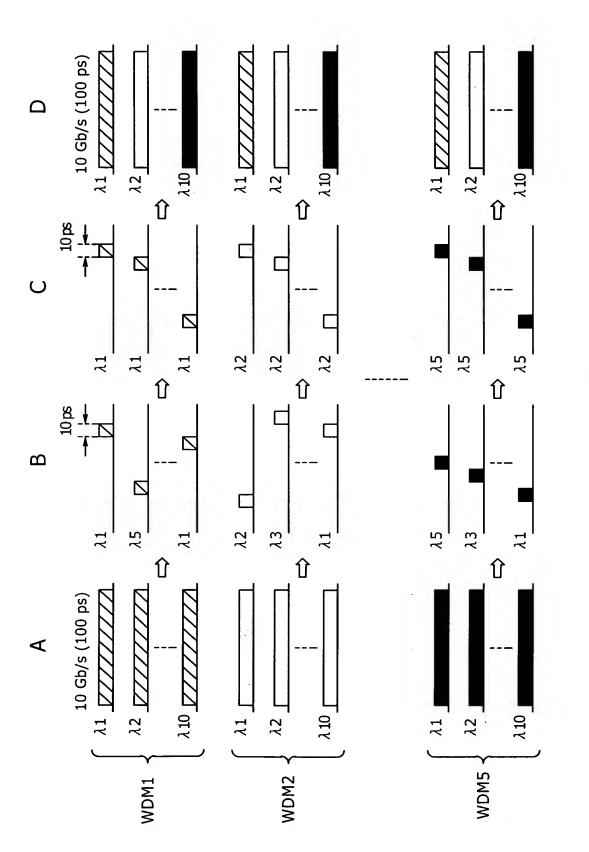
TITLE: OPTICAL CROSS-CONNECT APPARATUS INVENTORS: Yoichi OIKAWA et al. SERIAL NO.: DOCKET NO.: 1095.1298 OPTICAL CROSS-CONNECT APPARATUS WDM1 (λ1 to λ10) ($\lambda 1$ to $\lambda 10$) WDM5 OUTPUT OPTICAL SIGNAL PROCESSING SECTION OUTPUT OPTICAL SIGNAL PROCESSING SECTION $^{13-5}$ WAVELENGTH SWITCHING SECTION 12-5 12b-1 MULTI-PLEXER 12b-5 $\frac{1}{1}$ $\lambda 1$ λ5 2 FIG. 12-1 DEMULTI-PLEXER λ5 2۲ λ5 $\lambda 1$ 12a-1 2a-5 $\mathbf{\omega}$ INPUT OPTICAL SIGNAL PROCESSING SECTION INPUT OPTICAL SIGNAL PROCESSING SECTION 11-5 $\frac{11-1}{1}$ TRUNK NETWORK ($\lambda 1$ to $\lambda 10$) ($\lambda 1$ to $\lambda 10$) WDM5 WDM1

T

 λ_1 PROCESS PERFORMED BY OUTPUT OPTICAL SIGNAL PROCESSING SECTION 13 FIG. 2(B) λ5 WAVELENGTH CONVERSION PULSE WIDTH EXPANSION λ5 PROCESS PERFORMED BY INPUT OPTICAL SIGNAL PROCESSING SECTION 11 λ5 FIG. 2(A) λ5 WAVELENGTH CONVERSION PULSE WIDTH COMPRESSION PHASE SHIFT



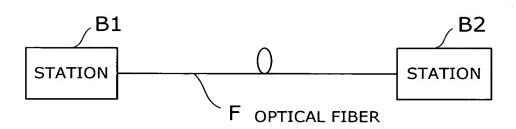
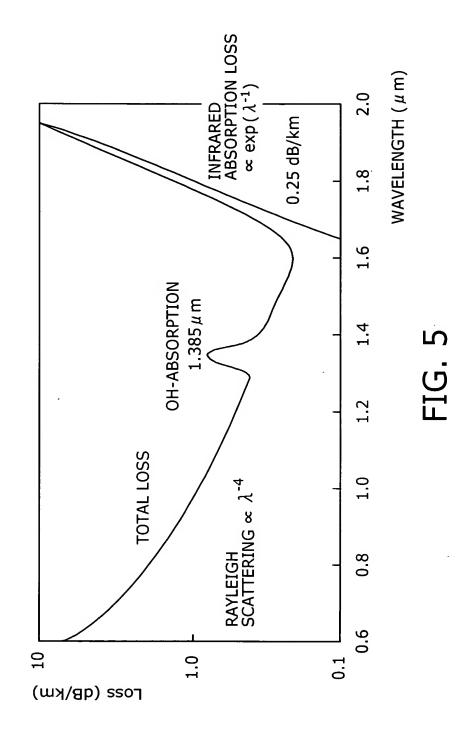


FIG. 4

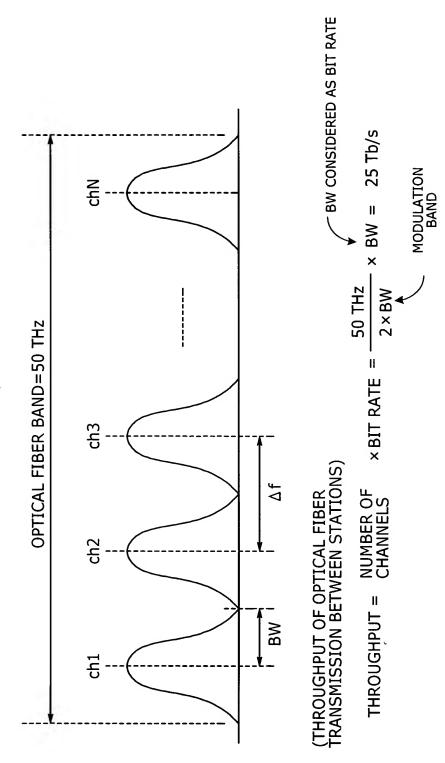


TITLE: OPTICAL CROSS-CONNECT APPARATUS
INVENTORS: Yoichi OIKAWA et al.

SERIAL NO.: DOCKET NO.: 1095.1298

BAND NAME	MEANING	WAVELENGTH RANGE
O BAND	Original	1260 nm to 1360 nm
E BAND	Extended	1360 nm to 1460 nm
S BAND	Short wavelength	1460 nm to 1530 nm
C BAND	Conventional	1530 nm to 1565 nm
L BAND	Long wavelength	1565 nm to 1625 nm
U BAND	Uitralong wavelength	1625 nm to 1675 nm

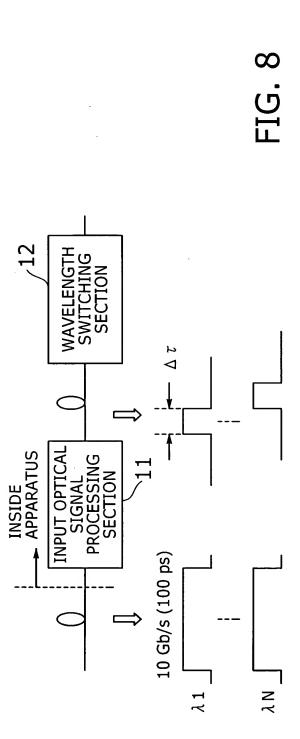
FIG. 6



A THROUGHPUT OF 25 TBITS/S IS A THEORETICAL UPPER LIMIT FOR AN OPTICAL FIBER BAND OF 50 THZ. WITH LONG-DISTANCE THROUGHPUT WILL BE CONSIDERABLÝ LOWER THAN 25 TBITS/S DUE TO THE NONLINEAR EFFECTS. RANSMISSION BY AN OPTICAL FIBER, HOWEVER, ACTUAL

TITLE: OPTICAL CROSS-CONNECT APPARATUS INVENTORS: Yoichi OlKAWA et al.

SERIAL NO.: DOCKET NO.: 1095.1298



(THROUGHPUT OF INTRA-APPARATUS OPTICAL FIBER TRANSMISSION)

BIT RATE OF ONE COMPRESSED PULSE

×

NUMBER OF COMPRESSED PULSES

THROUGHPUT=

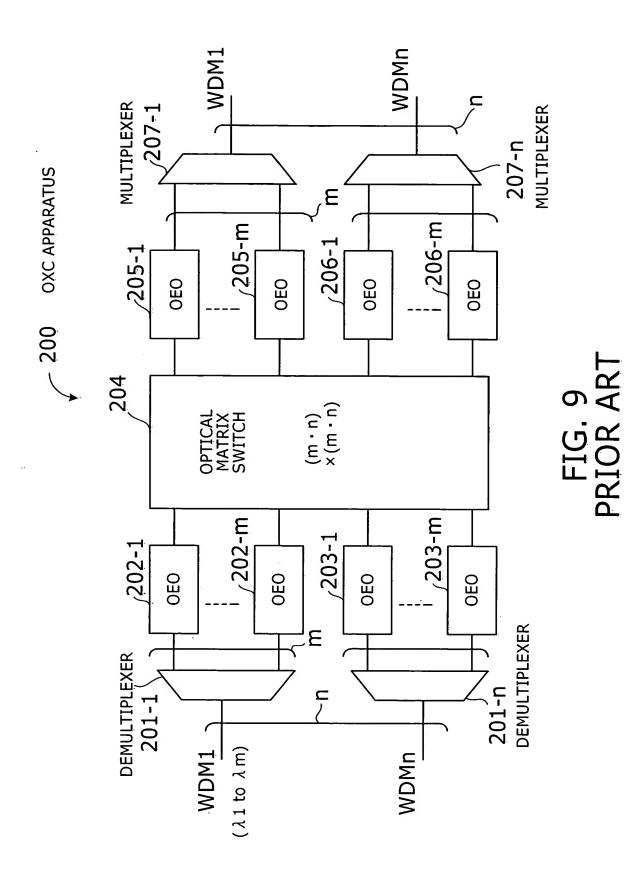
$$= \frac{50 \text{ THz}}{2 \times \left(\frac{1}{\Delta \tau}\right)} \times \frac{100 \text{ ps}}{\Delta \tau} \cdot 10 \text{ Gb/s} = 25 \text{ Tb/s}$$

$$= \frac{2 \times \left(\frac{1}{\Delta \tau}\right)}{\sqrt{\Delta \tau}} \times \frac{\Delta \tau}{\sqrt{\Delta \tau}} \cdot 10 \text{ Gb/s} = \frac{25 \text{ Tb/s}}{2}$$

$$= \frac{\text{BWfiber}}{\text{NUMBER}}$$

BETWEEN STATIONS, THE INTRA-APPARATUS OPTICAL FIBER TRANSMISSION IS SHORT DISTANCE A THROUGHPUT SO THE NONLINEAR EFFECTS OF 25 TBITS/S, BEING A THEORETICAL UPPER LIMIT, CAN BE ACHIEVED. JNLIKE THE OPTICAL FIBER TRANSMISSION HAVE NO INFLUENCE. THEREFORE **RANSMISSION.** LIMIT,

APPARATUS OPTICAL FIBER TRANSMISSION MAY BE CALCULATED BY MULTIPLYING (OPTICAL FIBER THE THROUGHPUT OF THE INTRA BAND) AND (1/2) TOGETHER.



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SERIAL NO.: DOCKET NO.: 1095.1298

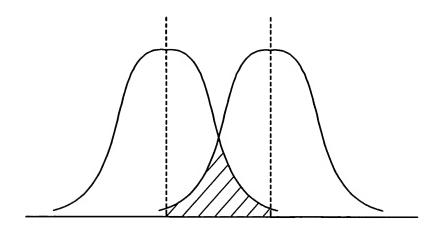


FIG. 10(A)

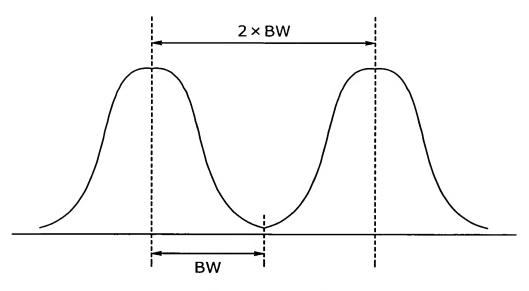


FIG. 10(B)

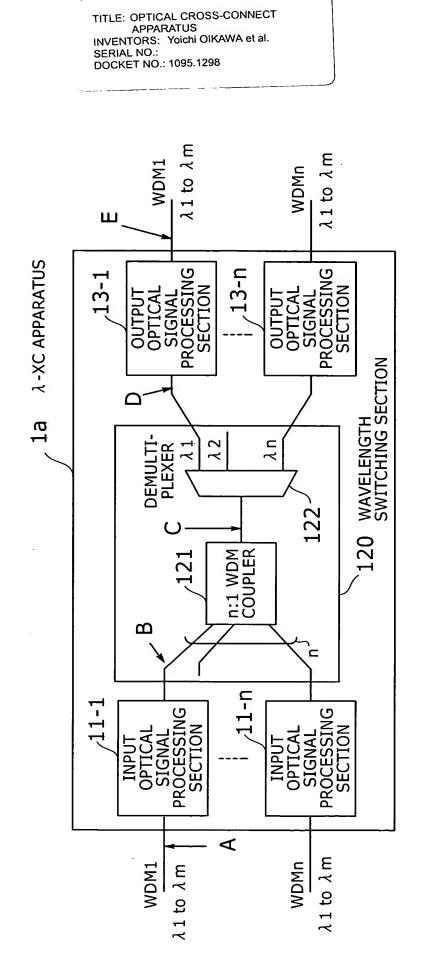


FIG. 11

TITLE: OPTICAL CROSS-CONNECT

APPARATUS
INVENTORS: Yoichi OlKAWA et al.

SERIAL NO.: DOCKET NO.: 1095.1298

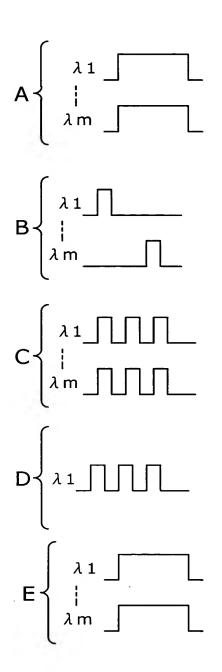
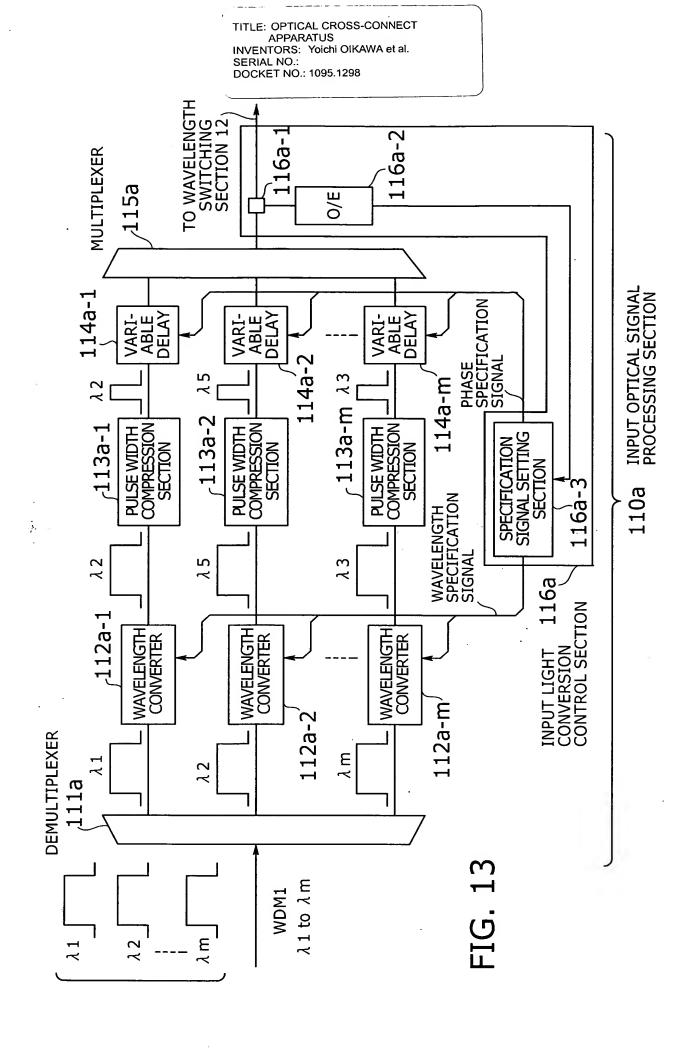
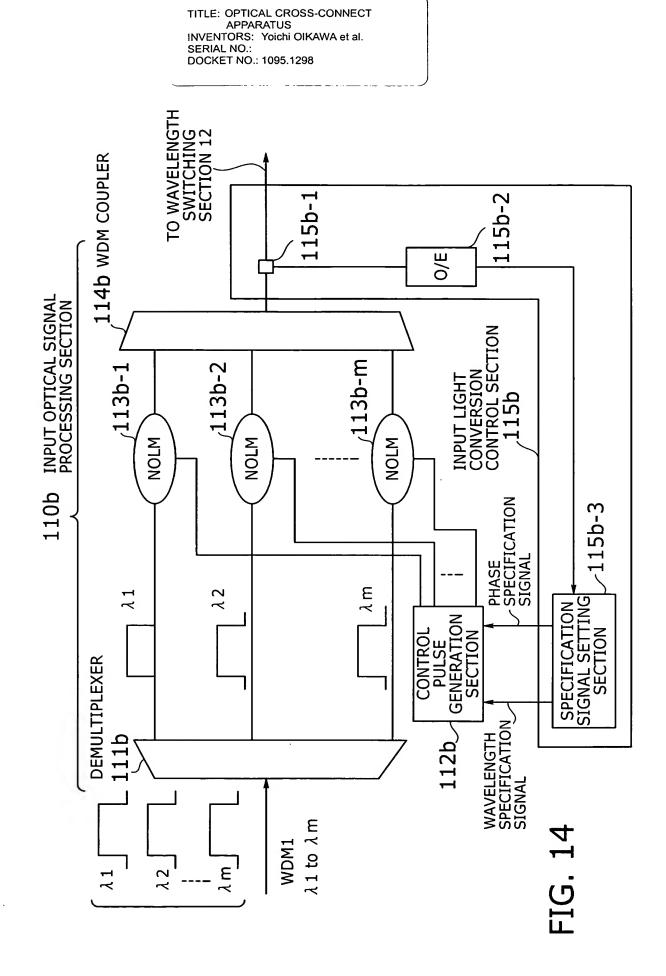
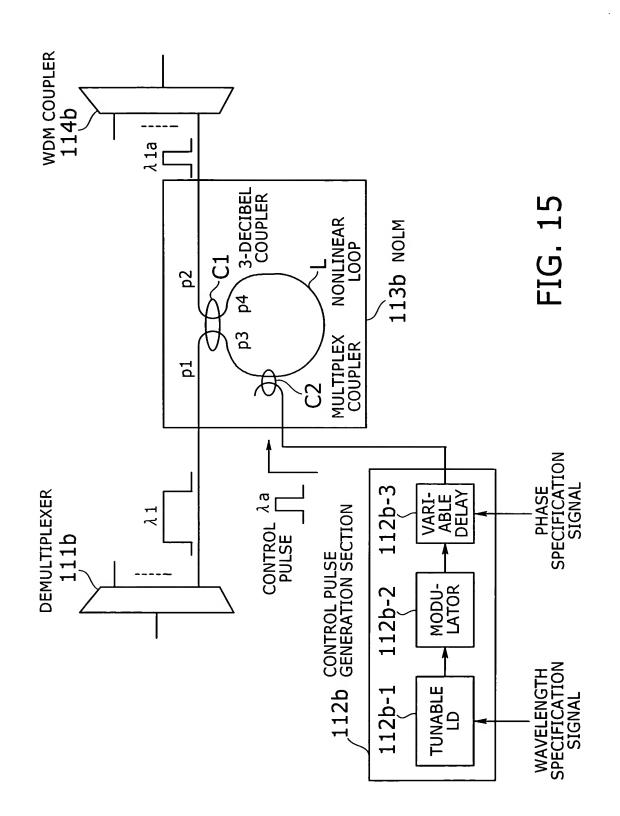


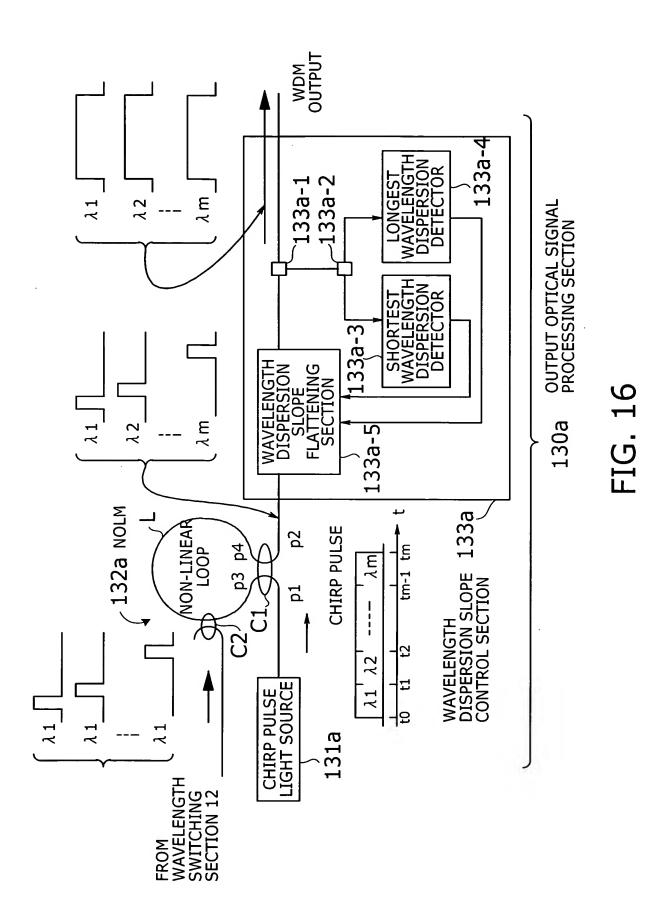
FIG. 12





DOCKET NO.: 1095.1298





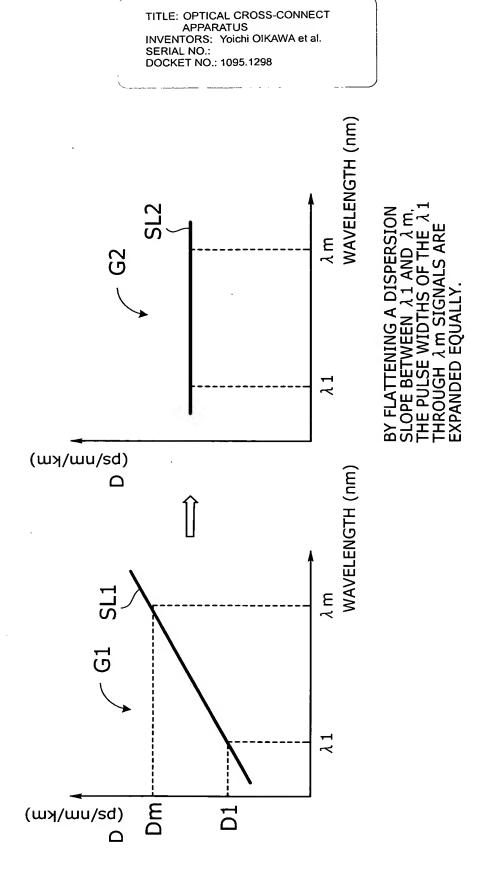
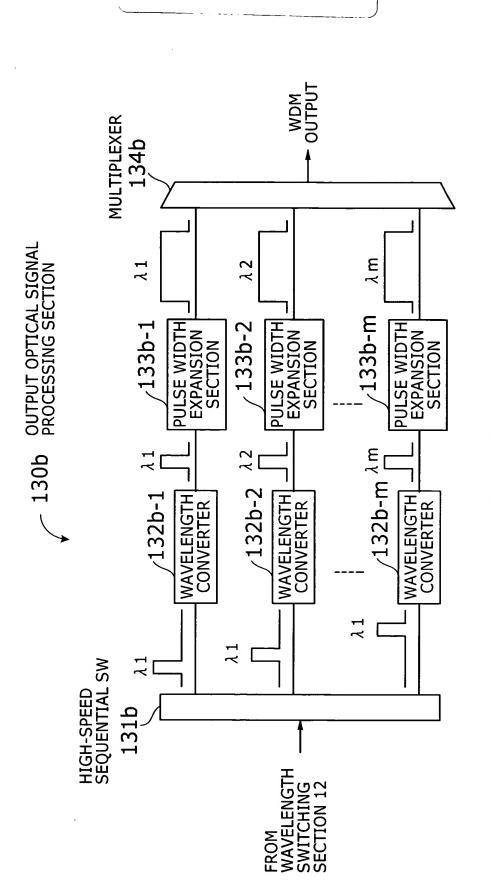


FIG. 17



TITLE: OPTICAL CROSS-CONNECT APPARATUS INVENTORS: Yoichi OIKAWA et al. SERIAL NO.:

DOCKET NO.: 1095.1298

FIG. 18

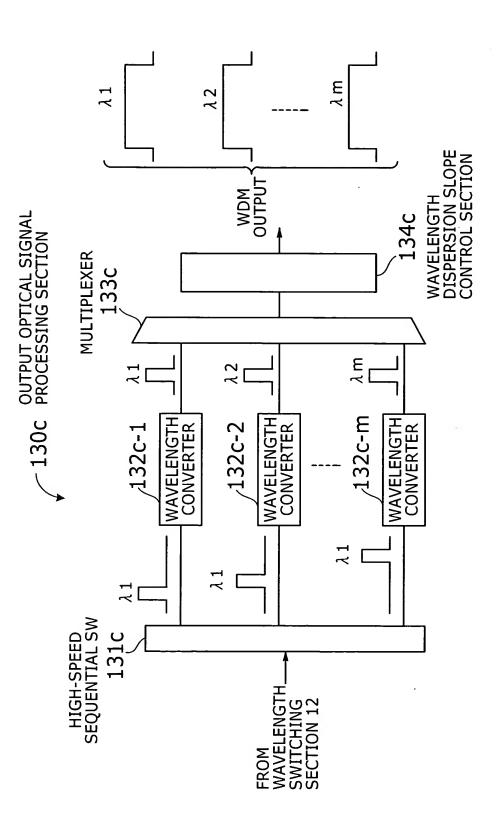
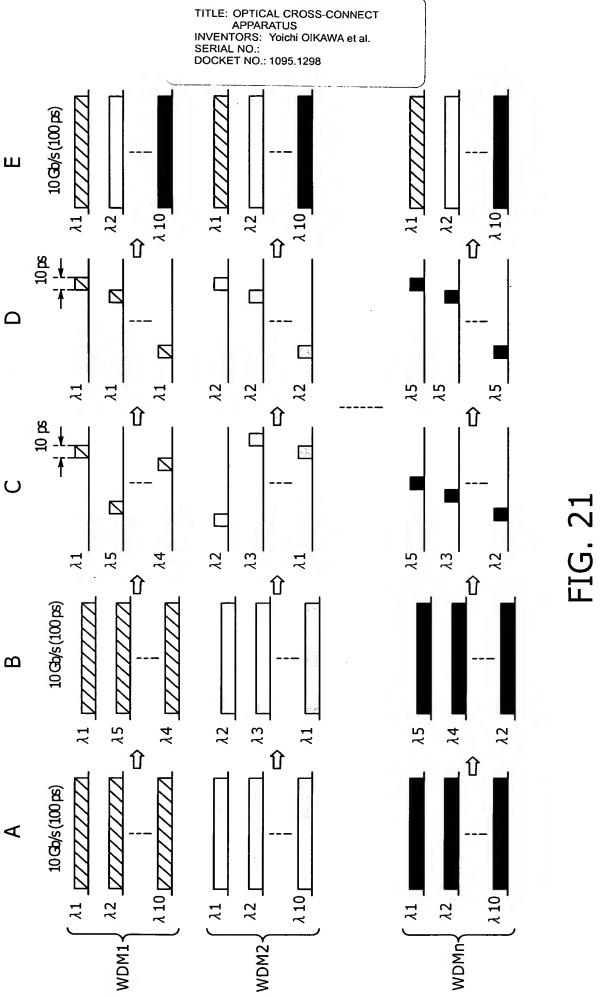


FIG. 19

SERIAL NO.: DOCKET NO.: 1095.1298 TRUNK NETWORK $(\lambda 1 \text{ to } \lambda 10)$ $(\lambda 1 \text{ to } \lambda 10)$ WDM5 WDM1 λ-XC APPARATUS 25-5 25-1 OUTPUT OPTICAL SIGNAL PROCESS-ING SIGNAL PROCESS-ING SECTION OUTPUT OPTICAL SECTION 20-5 24-1 24-5 MULTIPLEXER MULTIPLEXER Ŋ \prec Ŋ FIG. 20 23e-10 ~23e-2 23a-2 23a-10 PULSE WIDTH 234-10 COMPRESSION AND PHASE SHIFT SECTION 3a-1 23e-1 λ5 λ5 DEMULTI-PLEXER 22-5 DEMULTI-PLEXER 22-1 A WAVELENGTH SWITCHING SECTION മ 20-1 WAVE-LENGTH CON-VERTER WAVE-LENGTH CON-VERTER 21-5 21-1 TRUNK NETWORK $(\lambda 1 \text{ to } \lambda 10)$ $(\lambda 1 \text{ to } \lambda 10)$ WDM5 WDM1

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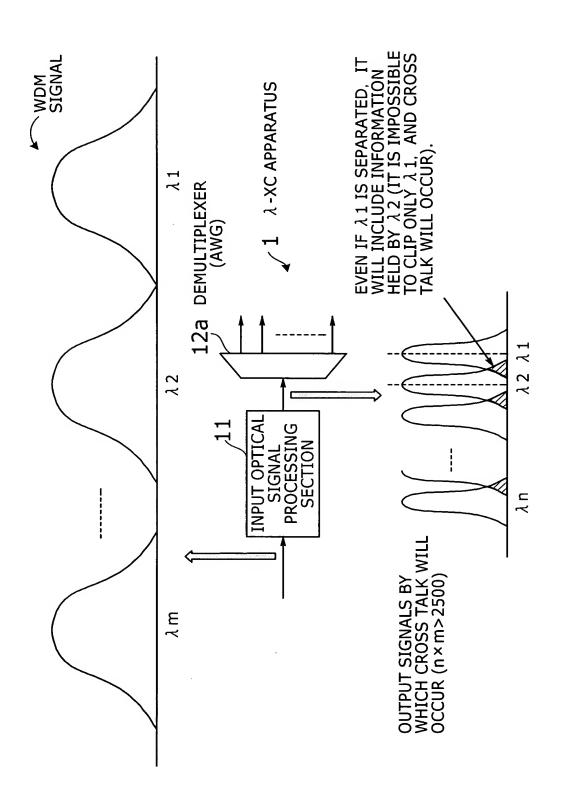
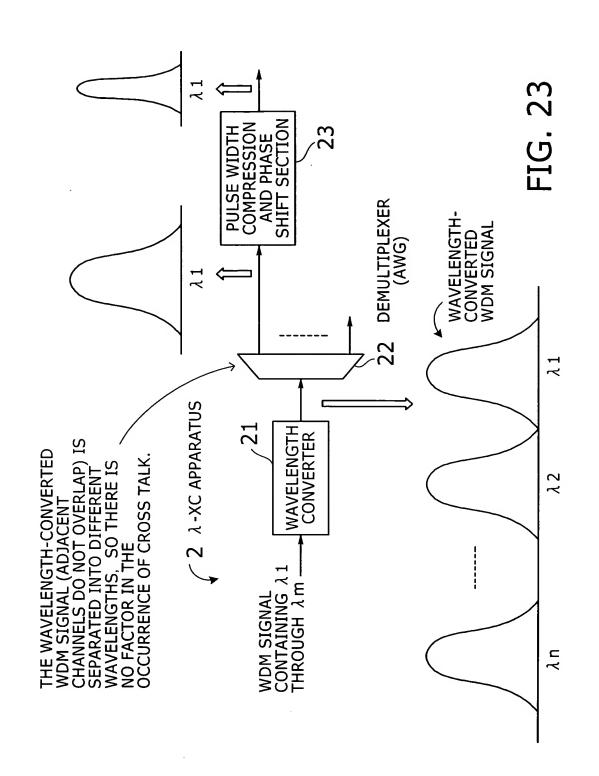


FIG. 22



CHANGE ONLY THE ORDER IN WHICH THE T IS IMPOSSIBLE TO SIGNALS SI AND S4 ARE OUTPUTTED. FIG. 24 53 **S**2 **S4** S1 p3c, 94c p4d p3d **SW53 SW54** SECOND STAGE , P6 ζď p2c p1c p1d p2d **BLOCKING TYPE** 4 **SW52 SW51** рЗа p3b 'P4 p4b FIRST STAGE p1b pla

S4

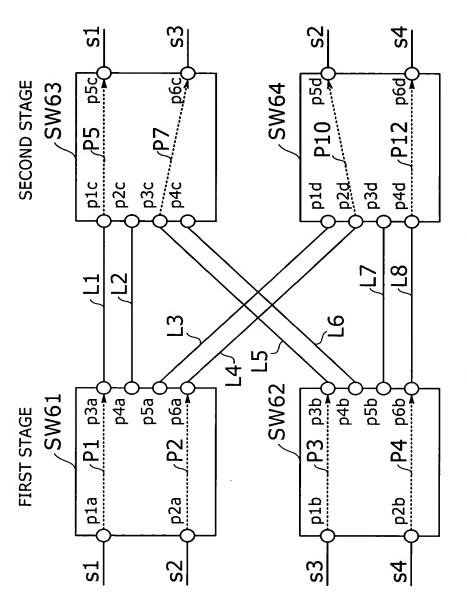
TITLE: OPTICAL CROSS-CONNECT APPARATUS INVENTORS: Yoichi OIKAWA et al. SERIAL NO.:

DOCKET NO.: 1095.1298

WHEN OUTGOING LINES CORRESPONDING TO (m-1) INCOMING LINES HAVE BEEN ESTABLISHED IN AN m.TIMES.m SWITCH, THE DESTINATION OF THE REMAINING PATH IN A SWITCH WILL BE DETERMINED.

S1

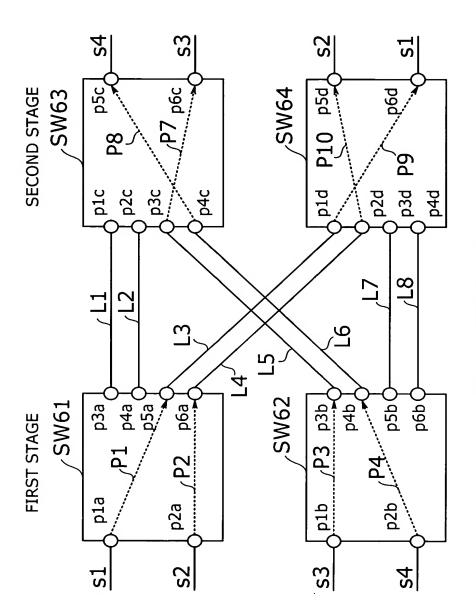
S2



NON-BLOCKING TYPE

FIG. 25

DOCKET NO.: 1095.1298



NON-BLOCKING TYPE

FIG. 26

TITLE: OPTICAL CROSS-CONNECT APPARATUS INVENTORS: Yoichi OlKAWA et al. SERIAL NO.:

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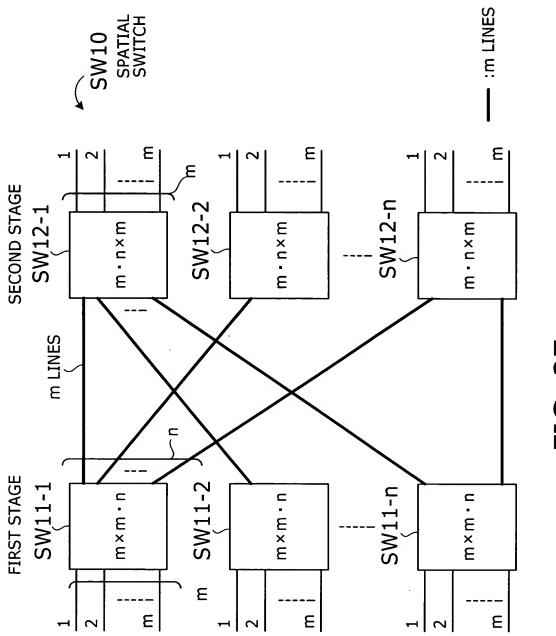


FIG. 27

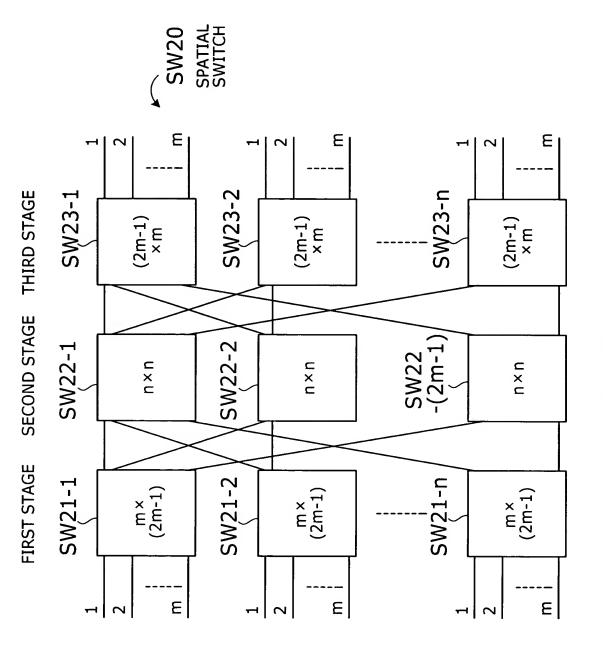
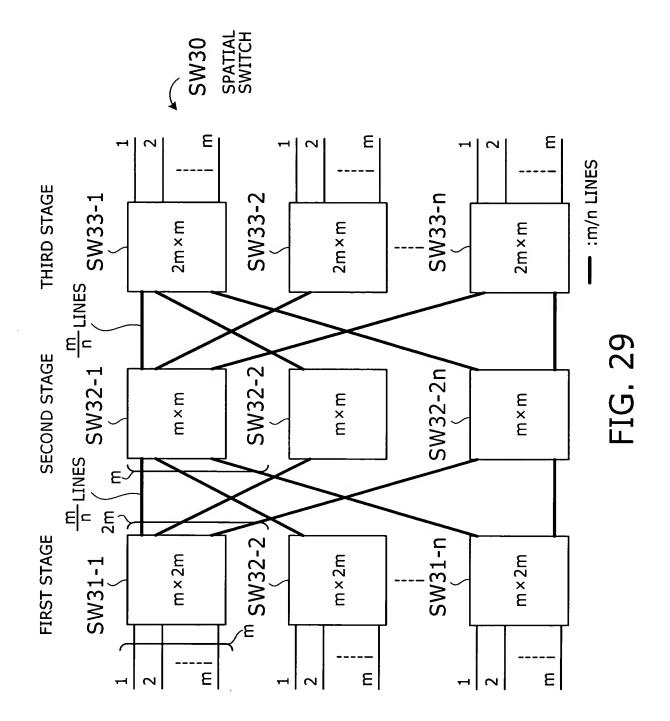
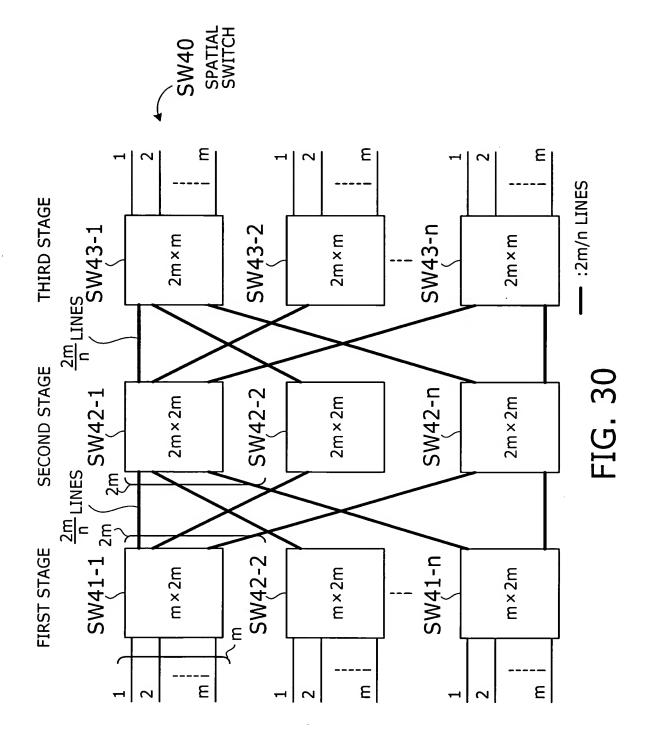


FIG. 28





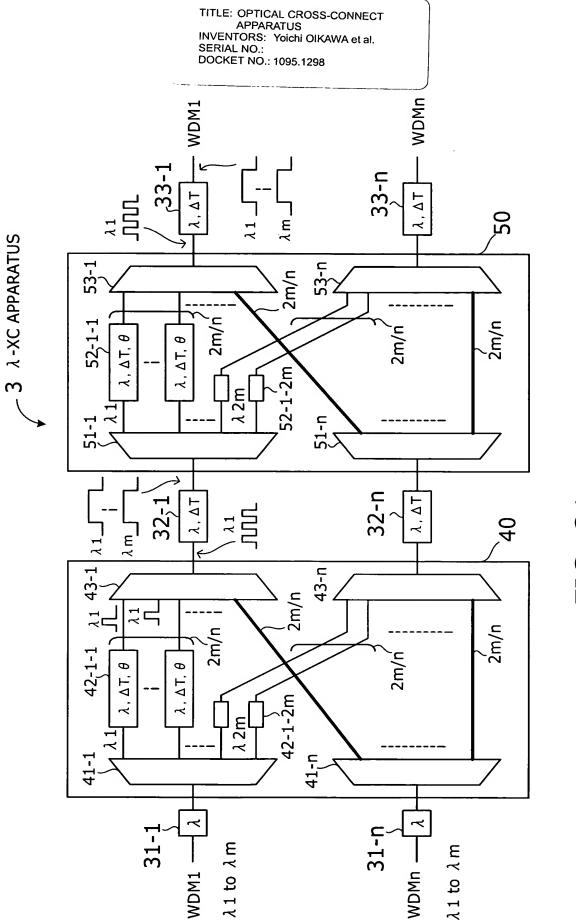


FIG. 31

TITLE: OPTICAL CROSS-CONNECT APPARATUS

INVENTORS: Yoichi OIKAWA et al.

SERIAL NO.: DOCKET NO.: 1095.1298

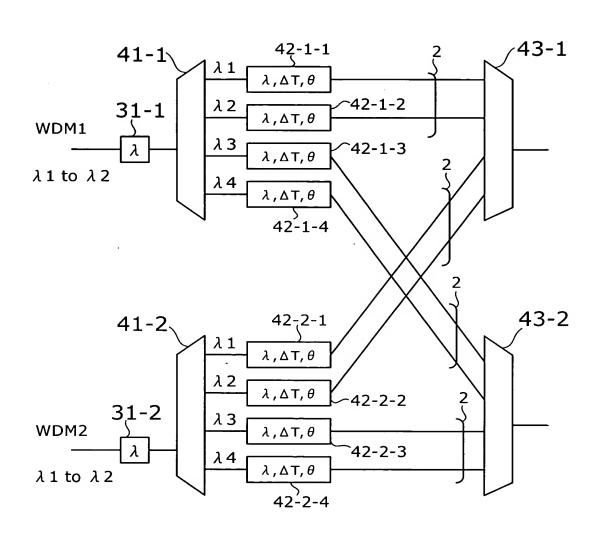


FIG. 32

TITLE: OPTICAL CROSS-CONNECT APPARATUS INVENTORS: Yoichi OIKAWA et al.

SERIAL NO.: DOCKET NO.: 1095.1298

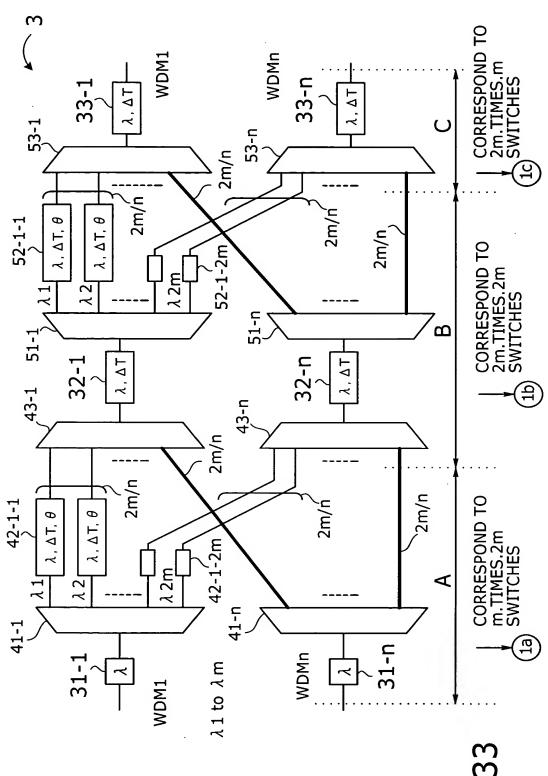


FIG. 33

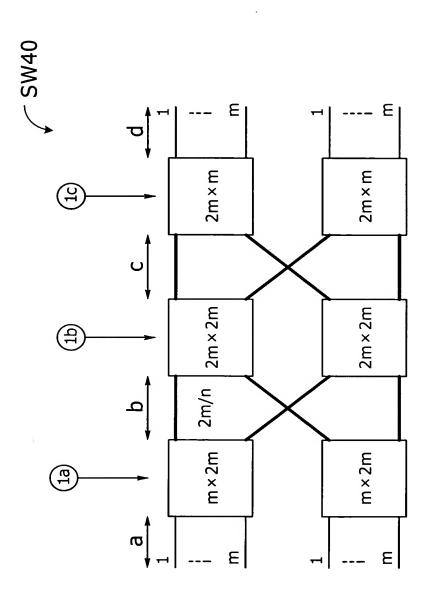
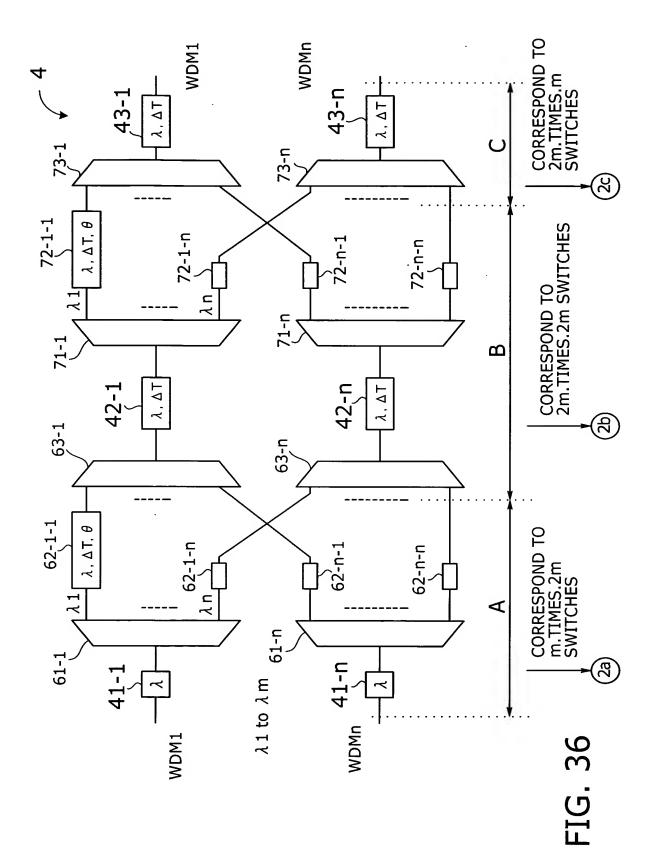


FIG. 34

∠ 4 λ-xC APPARATUS

FIG. 35



TITLE: OPTICAL CROSS-CONNECT APPARATUS INVENTORS: Yoichi OlKAWA et al.

SERIAL NO.: DOCKET NO.: 1095.1298

